SP2 COALESCENCE FILTRATION PERFORMANCE OF LAYERED STEEL FIBER MEDIA – POLYMER FIBER MEDIA

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The aim of this work is to evaluate the performance of coalescence filter media fabricated as alternating layers of non-woven stainless steel and non-woven polymer fiber media. Coalescing filter media are very effective in cleaning gas streams by removing liquid droplets. Gas streams containing liquid aerosol impurities are the common problems in industrial processes. Mostly, the droplets of greatest concern are in micron and submicron sizes. These impurities are harmful to the environment and can cause human health problems. It is best to remove those impurities from the gas streams before they are vented to the atmosphere to protect the environment and our health.

Many different filters have been developed for this application. Among them, fibrous filters have a high efficiency in removing droplets in micron-submicron sizes. They act as a coalescing medium where small droplets collected by the fibers merge together to form larger droplets which drain from the filter by gravity and enable cleaned gas to flow to the downstream processes.

In prior works, nonwoven stainless steel media were observed to have a reduction in pressure drop compared to glass fiber media, mainly due to a lower surface energy, but tended to have a reduced capture efficiency. Electrospun polymer fiber mats are known to have high capture efficiency but have a higher pressure drop due to the accumulation of liquid in the media. Multilayered media with alternating layers of stainless steel and electrospun mats have a potential for reduced pressure drop while maintaining high capture efficiency.

In this work, multilayered media of stainless steel fibers and electrospun fibers are tested and compared. Variations of fiber sizes and basis weights are explored. The effects of material properties are discussed.